FAA-STD-033
April 29, 1986

U.S. Department of Transportation

Federal Aviation Administration

Standard

DESIGN STANDARDS FOR ENERGY MANAGEMENT IN NAS PHYSICAL FACILITIES

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b. 10 CFR 436, Subpart A;

Co NBS Handbook 135;

d. Energy distribution utility companies in the area of the project,

3.1.4.2 Alternative/renewable energy sources. Alternative/renewable energy sources (as defined in 6.2.2) shall be evaluated when they can be shown to be cost effective and when otherwise directed by FAA.

3.1.4.2.1 Alternative/renewable electric power sources, Alternative/ renewable electric power sources shall be in accordance with FM Order 6980.26. These sources include but are not limited to:

a. Sunlight;

b. Photovoltaic cells (as defined in 6.2.2);

c. Wind energy. systems;

d. Fuel cells (as defined in 6.2.2);

e. Thermoelectric ‘generators (as defined in 6.2.2);

f. Thermionic generators,

3.1.4.2.2 Solar thermal energy systems, Solar thermal energy (as defined 6.2.2) system design shall be in accordance with ASHRAE Handbook, Systems and Applications Volumes and DOE/AD-0006/1, DOE/CS-0011 and SOLAR/0811-79/01. Solar panels shall be vandal proof and shall be installed where they will not be subjected to shade from trees, buildings (as defined in 6.2.2), or other structures (as defined in 6.2.2). Freeze protection shall be provided for hydronic systems.

3.1.4.3 Thermal energy recovery. Thermal energy (or heat) recovery shall be evaluated for NAS physical facilities whenever there can be shown an availability of excess or wasted energy and the simultaneous need for that energy. The energy savings potential and cost benefits depend primarily upon the number of hours per year that excess energy is available and can be utilized for purposes that would otherwise require the use of additional purchased energy. Recovered energy may be used for conditioning of ventilation air, space heating and service water heating, Design of and considerations (as defined in 6.2.2) for heat recovery systems shall be in accordance with ASHRAE Handbook, Systems Volume. 'Where the availability of excess energy and the need for that energy are not simultaneous, consideration shall be given to storing excess energy when available and using it at a later time.

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3.3.3.6 Motors. High efficiency motors shall be used. Single-phase motors shall be selected in accordance with NEMA MG-11. Polyphase motors shall be selected in accordance with NEMA MG-10. Motors shall be sized to handle design loads and designed for the particular environment encountered. Where the motor load varies significantly for extended durations, the use of multiple motors (i.e., a small and a medium size -motor) rather than one large motor shall be evaluated, Variable and multispeed motors and motors with variable or multispeed drives shall be evaluated. Variable frequency motor drives shall be utilized to the greatest extent that is economically feasible,

3.3.3.7 Peak load demand shaving. Peak load demand shaving (as defined in 6.2.2) shall be provided, where economically feasible, to reduce the peak demand. Peak load demand shaving techniques shall not adversely affect system reliability or maintainability. Peak load monitoring equipment shall operate in the same time interval as the power company's demand meter and if possible, shall utilize the power company's demand metering pulse.

3.3.3.7.1 Demand shaving techniques. Demand shaving techniques shall be considered, such as transfer of loads from normal power to standby engine generator systems, where available. A life cycle cost (as defined in 6.2.2) analysis shall be performed to determine the most economical engine generator system, gas, diesel, or gasoline. Consideration shall be given to local cost and availability of the various fuel types. Engine generator systems shall be carefully chosen to obtain the most efficient combination possible for the particular size required. Engine and generator efficiencies shall be reflected in the life cycle cost analysis.

3.3.4 Heating, ventilating and air conditioning (HVAC) systems.

3.3.4.1 Distribution. Air and water transport factors shall be the highest, most economical values consistent with ASHRAE Standard 90A. In order to minimize the energy consumed in distributing the conditioned air or thermal fluid, consideration shall be given to, but shall not be limited to the following energy management and conservation measures.

a. Minimize heat transfer through duct and pipes;

b. Minimize the pressure rating of the air handling system;

c. Minimize air/water leakage,

d. Conduct trade-off study between an all-air system versus a hydronic system;

e. Evaluate multiple delivery systems and multiple speed motors on individual fans or pumps for reduced loads or for staging.

3.3.3.6 Motors. High efficiency motors shall be used. Single-phase motors shall be selected in accordance with NEMA MG-11. Polyphase motors shall be selected in accordance with NEMA MG-10. Motors shall be sized to handle design loads and designed for the particular environment encountered. Where the motor load varies significantly for extended durations, the use of multiple motors (i.e., a small and a medium size motor) rather than one large motor shall be evaluated, Variable and multispeed motors and motors with variable or multispeed drives shall be evaluated. Variable frequency motor drives shall be utilized to the greatest extent that is economically feasible,

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3.3.4 Heating, ventilating and air conditioning (HVAC) systems.

3.3.4.1 Distribution. Air and water transport factors shall be the highest, most economical values consistent with ASHRAE Standard 90A. In order to minimize the energy consumed in distributing the conditioned air or thermal fluid, consideration shall be given to, but shall not be limited to the following energy management and conservation measures.

a. Minimize heat transfer through duct and pipes;

b. Minimize the pressure rating of the air handling system;

c. Minimize air/water leakage,

d. Conduct trade-off study between an all-air system versus a hydronic system;

e. Evaluate multiple delivery systems and multiple speed motors on individual fans or pumps for reduced loads or for staging.

3.3.3.6 Motors. High efficiency motors shall be used. Single-phase motors shall be selected in accordance with NEMA MG-11. Polyphase motors shall be selected in accordance with NEMA MG-10. Motors shall be sized to handle design loads and designed for the particular environment encountered. Where the motor load varies significantly for extended durations, the use of multiple motors (i.e., a small and a medium size -motor) rather than one large motor shall be evaluated, Variable and multispeed motors and motors with variable or multispeed drives shall be evaluated. Variable frequency motor drives shall be utilized to the greatest extent that is economically feasible,

3.3.3.7 Peak load demand shaving. Peak load demand shaving (as defined in 6.2.2) shall be provided, where economically feasible, to reduce the peak demand. Peak load demand shaving techniques shall not adversely affect system reliability or maintainability. Peak load monitoring equipment shall operate in the same time interval as the power company's demand meter and if possible, shall utilize the power company's demand metering pulse.

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3.3.9 Energy and load management. Energy management and control systems designed to reduce energy use or reduce energy costs shall be evaluated for use at NAS physical facilities. Energy management and control systems shall be evaluated for control throughout the physical facility, control of a group of systems or devices, or control of an individual device or system,

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3.3.9.1.1 Dead band control system. A dead band control system operates solely on the basis of room temperature, It establishes a relatively wide range (dead band) over which no heating or cooling is provided, As the temperature falls below or rises above dead band settings, heating or cooling is gradually increased. A space demand reset control is provided which uses space temperature to automatically readjust the temperature of the air being supplied to heat or cool the space. A dead band control is applicable to HVAC systems which provide heating and cooling in sequence; it can be used effectively even when these systems have economizer cycle controls or are interfaced with higher levels of energy management control systems.

3.3.9.1.2 Chiller energy management controller. A chiller energy management controller uses programmed logic to load, unload, start, and stop centrifugal chillers. The controller also resets suction temperature automatically by sensing load requirements; remotely monitors and displays inlet vane position in percentage, as well as chiller operating hours; and starts the standby chiller automatically, when needed,

3.3.9.2 Remote limited and multifunction energy management control system. Remote limited and multifunction energy management control system devices are typified by a limited function demand controller, which interfaces with numerous energy consuming devices and systems to limit electrical demand. Energy management control system devices are programmable through use of microprocessors and provide for multifunction capability in a common enclosure. Remote limited and multifunction energy management control system devices usually are most applicable when the functions to be performed are limited, and there are fewer than one hundred (100) points to be monitored and controlled,

3.3.9.2.1 Demand controller. A demand controller prevents electrical demand from exceeding a predetermined maximum, Certain interruptible non-critical or secondary loads are connected to it. As usage approaches

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5. PREPARATION FOR DELIVERY

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6.2.2.17 Requirement, A specified capability which must be provided by the system, subsystem, end item, contractor, etc. Type of requirements include operational, functional, performance, interface, facility, and verification requirements.

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